Enviroscope

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LDR Exclusion for Laboratory Wastewaters

Wastewaters discharged from the sinks of production support laboratories in most electroplating and surface finishing facilities are a minuscule portion of the total chemicals and flow to the wastewater treatment facility. When you are very knowledgeable of the complex operation of your facility, and the issues that are truly important to the impact of your plant on the environment, it is frustrating to be seriously challenged by a regulatory authority about those seemingly unimportant laboratory chemical wastewater discharges. Why are they concerned?

The Regulatory Perspective

Look at it from their perspective. Those laboratory chemicals are frequently a significant portion of a plant's material and safety data sheets (MSDSs). Without knowledge of the quantities used, they appear from the MSDS to be the chemicals of greatest concern. To the general public, they just sound hazardous. Do not assume that local and state staff, who monitor your environmental regulatory compliance, have a technical education. With joint Occupational Safety and Health Administration (OSHA) and U.S. Environmental Protection Agency (EPA) facility inspections becoming more frequent, there have been more questions about the chemicals in production support laboratories. When questioned, you must be prepared to immediately demonstrate regulatory compliance so that these wastes do not become issues that can be complex and costly to resolve.

The EPA has clearly stated that land disposal restrictions (LDRs) apply to wastes at the point of generation, not the point at which several waste streams are aggregated (52 *Federal Register* 25766, July 8, 1987). Although aggregation of wastes to facilitate proper treatment is permissible under certain circumstances, the hazardous waste determination must be made prior to aggregation. The EPA has even stated that, given a situation in which several waste streams converge to create a larger waste stream in a hard-piped system, it is not unreasonable to expect the generator to install sample taps at upstream locations so that individual waste streams may be sampled (52 *FR* 25766). Therefore, all wastes, including laboratory wastes, must be evaluated at the time they are discarded to determine whether they meet the definition of hazardous waste and, if so, which waste codes and treatment standards are applicable.

The LDR regulations state that wastes may not be diluted as a substitute for treatment to achieve compliance with the LDR treatment standards [40 CFR §268.3(a)]. Dilution of wastes, however, that are hazardous only because they exhibit a characteristic in a treatment system that treats wastes subsequently discharged under a Clean Water Act (CWA) permit is permissible, unless a method has been specified in §268.42 as the treatment standard, or unless the waste is a D003 reactive cyanide wastewater or nonwastewater [§268.3(b)]. [Deactivation (DEACT) is not considered a "specified method" for purposes of this determination.]

Some Exclusions

Recognizing some of the difficulties encountered by laboratories in complying with the regulations, EPA has written exclusions for certain laboratory wastes. Laboratory wastewaters containing toxic (T) wastes listed in §261 Subpart D, which are treated in a CWA facility, are excluded from regulation as hazardous waste, if the annualized flow of laboratory wastewater does not exceed one percent of the total wastewater flow into the headwork of the wastewater treatment system, or if the combined annualized average concentration does not exceed one part per million in the headworks of the facility's wastewater treatment system [§261.3(a)(2)(iv)(E)]. Additionally, laboratory wastes displaying the characteristic of ignitability (D001), corrosivity (D002), or organic toxicity (D012–D043) that are commingled with other plant wastewaters treated in CWA facilities are not subject to LDR prohibitions, if the annualized flow of the laboratory wastewater does not exceed one percent of the total wastewater flow into the headwork of the wastewater treatment system, or if the combined annualized average concentration does not exceed one part per million into the facility's headworks [§268.1(e)(5)].

Evaluating Hazardous Waste

Every waste stream must be evaluated at the point of generation to determine if any hazardous waste codes are applicable. Unless one of the above exclusions can be applied for wastes treated in CWA facilities, the waste must be treated to meet all applicable treatment standards specified in §268 Subpart D, even if the waste has been commingled with other wastes.

For example, in the case of a waste that is high total organic carbon

(TOC) ignitable (D001), characteristically hazardous waste at the point of generation, two methods (recovery of organics or combustion) have been specified as treatment standards per §268 Subpart D. If the generator does not qualify for the above exclusion of §268.1(e)(5), this waste stream is subject to LDR and may not be diluted as a substitute for treatment to meet the specified standard. In other words, if your laboratory waste exceeds the flow or concentration LDR exclusion for annualized influent to your wastewater treatment facility, this waste must be treated by incineration, fuel substitution, or organic recovery. If the waste is mixed with other wastes, the entire mixture must be treated using one of these methods.

The importance of demonstrating and retaining your LDR exclusion for laboratory wastewater is obvious. How do you do it?

Retaining an LDR Exclusion

The annualized average influent flow of most wastewater treatment facilities is easily determined from the effluent discharge records (influent is proportional to effluent flow). The average wastewater composition and flow from each laboratory sink can be measured by collecting all discharges to it in a pan over a period of routine operation (typically two weeks). Record the volume collected and save a proportional volume of sample in a large laboratory wastewater composite sample bottle each time the pan is emptied. The total volume of composite sample collected can be used to verify the accuracy of the recorded total volume of wastewater discharged from all sinks. From the total volume discharged to the sinks and the time period of study, the annualized average flow of laboratory wastewater and percent of wastewater influent flow can then be calculated.

Precise quantities of chemicals are used in each laboratory analysis, so the total mass of each chemical discharged over a period of routine operation and the combined annualized average concentration in the headwork can be calculated. (Do not overlook the non-routine laboratory wastewater discharges, especially analytical standards. Discard of aged standard solutions is sometimes a significant part of the total laboratory waste mass, where analytical support is not well-coordinated with scheduled production, and excess standards are prepared.) Inventory and purchase records of laboratory chemicals can be used to verify the calculated annual mass discharge. Analysis of the concentration of a major constituent in the laboratory sink wastewater composite sample, which was collected during the period of study, can also verify accuracy of the calculated mass discharge, as well as the total volume of wastewater discharged. These independent methods for verification of accuracy normally are needed only when study of your laboratory wastewater indicates marginal attainment of the LDR exclusion.

Use Practical Methods

There may be better methods to characterize the wastewater discharges from your plant's laboratory, so choose a practical approach specific to your facility. Not only does this exercise demonstrate LDR compliance, but it frequently identifies actions that can be taken to reduce waste generation. Out-of-date chemicals can often be returned to the supplier for recycle, or donated to a college laboratory. The unused portion of process solution samples also should not be discarded to the laboratory sink, but should be returned to the process vessels from which they were collected. That spring-operated foot-peddle valve on your laboratory sink, which ensures automatic shutoff when not in use, may be more valuable than realized. After the spigots of laboratory sinks have been observed flowing for no apparent reason during an environmental compliance audit, it can be difficult to gain acceptance of your study that had demonstrated insignificant laboratory wastewater.

When production decreases in captive shops, wastewater from their support laboratories seldom decreases proportional to process wastewater. The laboratory is often even busier with support of new product development. Attention to their LDR exclusion during extended periods of reduced production is wise, as well as when implementing new water conservation and reuse projects in your plant.

If you ever have to establish strict administrative control of laboratory wastewater discharges to ensure LDR compliance, be cautious. Recently, I advised that one liter of obsolete calibration standard containing 150 mg of total mercury could be discharged via a laboratory sink to the plant's wastewater treatment facility. I subsequently learned that the one liter was more than one standard, and 150 ml containing 500 mg/kg total mercury was discharged.

Stay Cautious

At first glance, it would appear that no treatment technology has been specified in §268 Subpart D for high mercury wastewaters, because the "Treatment Standards for Hazardous Wastes" table indicates "N/A" for this category. However, the EPA has specified that "any wastes that contain greater than 260 mg/kg of total mercury, but that otherwise appear to meet the definition of wastewaters, are, in fact, classified as nonwastewaters that must be treated by *incineration* or *recovery* technologies" (56 *Federal Register* 3874). Therefore, any wastes that contain ≥260 mg/kg total mercury at the point of generation may not be diluted in a wastewater treatment system, even though they may appear to meet the Resource Conservation and Recovery Act (RCRA) definition of wastewater. This minor RCRA non-compliance was subsequently included in the hazardous waste generator's quarterly report to the regulatory authority.

This one exception to the RCRA definition of a wastewater is in the >1000-page preamble to the 3rd-3rd Land Ban. The EPA advised that it had not considered laboratory wastewater, in which the solubility of mercury is known and the quantity is small, when making the exception.

This example illustrates what a headache those seemingly unimportant laboratory discharges can be, even when you are reasonably knowledgeable of environmental regulations. Before beginning evaluation of every laboratory waste stream generated in your plant, take an aspirin and call a consultant. o

Columnist's Note: *Contributions of D.G. Poulos, A.L. Patterson, and J. G. Suhm to the study of the LDR exclusion of laboratory wastewater are appreciated.*